



# 17 years of Innovation

### Reliable & Flexible Testing Solutions for a Sustainable Future



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## About Neware

Since 1998, Neware has been committed to providing world-class testing solutions for the batteries and capacitors. We adopt SAP as our ERP system and comply with ISO9000 quality management standard. Our factory spans over 4,400 square meters in industrial park, Shenzhen office spans over 2,000 square meters, housing all R&D, Engineering, Sales and CRM personnel. To explore international market, we launched Hong Kong and France offices in 2011.



17 17 Years

Continuous innovations in the battery testing industry for over 17 years.

10% We invest more than 10% of our revenue for our R&D to bring out newly technology and to

improve the testing experiences.

Shenzher

1,000нг

We designed and shipped our sophisticated series which is characterized with a max. data acquisition frequency of 1,000Hz, a minimum pulse width reaching 400us, an accuracy of 0.02% FS and auto multi-current ranges enabled.



# 800 kva

The largest single unit we have ever shipped is 800V1,000A. And the maximum current range reaches 3,000A, with a voltage range of 5V.



Uninterrupted operation hours of 43,000 hours, and equipment still outputs and measures accurately.

90,000 sets

We had shipped more than 90,000 sets (or more than 1,000,000 channels) of equipment at the end of year 2014.



We supply, cooperate with more than 19,000 customers all over the world, ranging from battery manufacturer to R&D institutes.

## History

1999 CIBF 4th 2001 CI		CIBF 5th	2003		2004 CIBF 6th	2006 CIBF 7th
The first- generation tester came out,based on RS232.	BFGS Forma Gradir went in produc	(Battery tion and ng System) nto mass ction.	The second- generation te BTS-2000 cat out,based on architecture, TCP/IP differd from previou RS232, surmounted power technid difficulties.	ester me C/S using ent is high- ical	ISO9000 certified,and adopted the SAP intelligent business management system. NSAP	The third- generation tester BTS-3000 was developed successfully,with max power up to 21KVA.We won the membership of China's Software Enterprise Association.
2007		2008 CIBF 8	8th	2009	)	EVS-25 2010 CIBF 9th
By adopting AMER business model, w reorganized our sa department, production department and ou logistic supply cha We have also enlarged our office and factory.	3A ve ales ur ain.	The fourth-g tester BTS-4 was develop successfully provides pu and DCIR te has increase our domesti overseas ma in high-end equipment.	generation 000 ped ,lt lse test est,which ed c and rket share testing	EVTS- and au chann been o succe: provid testing into o main EV ba in Chi	6000 uxiliary tel have developed ssfully, which de EV battery g.Growing ne of the suppliers of ttery testers ina.	The fifth-generation tester BTS-8000 was developed,providing simulation of driving. And Our NBIS was introduced to the market.Our company was awarded the "Harmonious Labor Relations Enterprise" and the "Top 500 Growing Enterprise" by the government.

2011	2012 CIBF 10th	2013 EVS 27	CIBF 11th Battery Show 2014 Battery Japan		
The sixth-generation tester BTS-9000 was developed,providing the high- performance test solution to battery material research. Strengthen our market share of EV battery testing equipment.	LIMS was launched for laboratory information management. It complies with ISO17025 and focuses on testing process and result management. And we were awarded the Top 100 Independent S&M Innovation Company .	A mature ERP system based on SAP, naming NSAP 3.0, was online. This has evidently simplified and solidified our business. New instrument utilizing energy saving technology successfully launched. Joined the EVS27 in Spain.	We attended Battery Japan 2014(February, Tokyo) and Battery Show 2014(September, Detroit, USA) as an exhibitor. We brought our most advanced BTS9000 demo machine. Up to 1,000Hz acquisition frequency, 0.02%FS accuracy and 400us minimum pulse width, all the key specifications reached the world top level		





## System Architecture



### Cutting-edge Technology for Battery Material Research



### Features

- 1 Resolution: AD: 16bit; DA: 16bit;
- 2 Accuracy : 0.02% FS;
- 3 Response Time: ≤100us (Current in the range 10% ~90% FS);
- **4** Data Acquisition Frequency: 1000Hz;
- 5 Minimum Pulse Width: 400us;
- 6 Voltage Range: 5V;
- Current Ranges: Range 1: 160uA ± 32nA

Range 2: 5mA  $\pm$  1uA Range 3: 160mA  $\pm$  32uA Range 4: 5000mA  $\pm$  1mA

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2	COCIChe	Cerrent ink)	500	Cerrent Ink)	œ	100	Best step	Curr 3nvdi		1
		Valx 00	4.2					Main Chi Pro	hect	
					~			Volt Upper	43	1
	ccocag	Correction	3000	PALCON	~	2.1	Best step	Volt Lover	2.65	3
					~	10.17.00.000	No. of Concession, Name	Curr Upper	4.5	1
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	1.1							Cap Upper		3
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								Volt Inval		3
								Trop Droval		3
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								Volt Upper		3
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Applications

pulses tests;

and etc.

2 Cyclic Voltammetry;

**1** GSM/CDMA/GPRS and other

**3** Rate, Static capacity, cycle life

### Neware's BTS 9000 VS Vendor M's TXXXX

Pulse width: BTS9000 is 400us in both nominal and actuality, TXXXX is 100us(nominal)and 150us(actuality, and the 1st step pulse width has to be more than 2ms).



### **2** Pulse noise: BTS9000 is better.



Cutting-edge Technology for Battery Material Research



### GSM Curves Output by BTS 9000, Captured by Agilent Oscilloscope











Agilent

ン % 私信標式 200M/Sava

油江

### Low power BTS 4000

BTS 4000 entered into market in the year of 2008. Now it is one of the most successful and most popular battery testing system in China. Thousands of battery manufacturers, battery research institutes and laboratories use it as their primary testing partner for their various testing activities.



### Features

- 1 Resolution: AD: 16bit; DA: 16bit;
- 2 Accuracy : 0.05% FS\*;
- 3 Response Time:  $\leq 10$ ms (Current in the range  $10\% \sim 90\%$  FS);
- 4 Output Power: Max. 21kVA (user-definable);
- **5** Data Acquisition Frequency: 10Hz / 100Hz Optional;
- 6 Minimum Pulse Width: 500ms.

\*For testers curent output range  $\leq 6A$ , the accuracy is 0.05%FS For testers curent output range > 6A, the accuracy is 0.1%FS



### Applications

 DCIR / Pulse Test / HPPC
 Rate, Static capacity, cycle life and etc.

### High power BTS 4000

Due to the rapid data acquisition frequency, BTS 4000 could also be applied for super capacitor or EDLC (Electronic Double Layer Capacitor) tests. Through our advanced software, the capacitance, DCIR(Direct Current Internal Resistance) and LC(Leakage Current) could be easily calcultaed.



### Driving Cycle Simulation











### Features

- 1 Resolution: AD: 16bit; DA: 16bit;
- **2** Accuracy : 0.1% FS;
- 3 Response Time:  $\leq 20$ ms (Current in the range 10% ~ 90% FS);
- 4 Max. Output Power: 21kVA;
- **5** Data Acquisition Frequency: 10Hz;
- 6 Current Ranges: Max. 4 current ranges;
- 7 Minimum Pulse Width: 500ms.

### Applications

- 1 Driving Cycle Simulation;
- 2 Pulse Test / HPPC;
- **3** Rate, Static capacity, cycle life and etc.

# $\frac{\text{Accuracy}}{0.1\%}$

**Pulse Test** 

Current Range Max. 0.1% current ranges





Data Acquisition Frequency 10<sub>Hz</sub>





## EVT 7000

### **Electric Vehicle Testing System**

Characterized with IGBT, reversible AC/DC converter and CAN supported, our EVTS 7000 brings you higher energy efficiency, smaller space and much convenient to utilize the existing gauge integrated in BMS/BMU.





Our auxiliary single voltage sensors will help you capture the voltages of every single cell in series. this will largely increase the testing safety. You can have an advanced control based on the captured values.





# Features

- **1** Resolution: AD: 16bit; DA: 16bit;
- 2 Accuracy : 0.1% FS;
- 3 Response Time:  $\leq 20$ ms (Current in the range  $10\% \sim 90\%$  FS);
- 4 Max. Output Power: 21kVA;
- Data Acquisition Frequency: 10Hz; 5
- Current Ranges: Max. 4 current ranges; 6
- 7 Minimum Pulse Width: 500ms.

## **Applications**

- **1** Driving Cycle Simulation;
- 2 Pulse Test / HPPC;
- **3** Rate, Static capacity, cycle life and etc.

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## BTS ES (Energy Saving)





### $PF \ge 0.98$



Voltage & Current Phase of DC to AC

### Features

- 1 Resolution: AD: 16bit; DA: 12bit;
- **2** Accuracy : 0.1% FS;
- 3 Response Time: ≤20ms (Current in the range 10% ~90% FS);
- 4 Output Power: Max. 10kVA (user-definable);
- 5 Data Acquisition Frequency: 1Hz;
- **6** THD: <5%;
- **7** PF: ≥0.98.

### **Applications**

Bulk Testing / Mass Production Testing;
 Rate, Static capacity, cycle life and etc.

For a battery manufacture, it manufactures 25Ah batteries with LFP cathode, and have below similar testing process:

Formation(Fully Charged) → Fully Discharged → Fully Charged → Fully Discharged → 50% SOC

Coulombic Efficiency	100%
Daily Input	1,000pcs
Electricity Price	0.18US\$/kWh
Internal Consumption (for charge/discharge per channel)	8Wh



Unit: Wh

	Energy Required for Charge	Energy Required for Discharge	Energy Consumption
Energy Saving	2.5*(25*3.2*1,000)/67%	-2*(25*3.2*1,000)/54%	4.5*8*1,000
Conventional	2.5*(25*3.2*1,000)/45%	0	4.5*8*1,000



Total Daily Electricity Consumption	Annual Electricity Consumption
248.1kWh	64,506kWh
480.4kWh	124,915kWh

Total Energy Saved	60,407.62kWh
Total Money Saved	US\$ 10,873.37
Total Carbon Dioxide Reduced	42.62Metric Ton

reenhouse Gas Equivalencies Calculator: http://www.epa.gov/cleanenergy/energy-resources/calculator.htm

## ACR

### Portable AC Resistance Meter

### Features



## Calibration Solution





## Accessories



## Products Sheet

		≤18KW	≤18KW	≤18KW	≤10KW	≤800KW	≤225KW
Category	Application	BTS 3000	BTS 4000	BTS 8000	BTS 9000	EVT 6000	EVT 7000
Formation and Grading	Cell						
Formation and Grading	Super Capacitor						
	Battery(cell、module、pack)						
Capacity、Power、Energy、SOC	Super Capacitor			$\checkmark$			
Testing, Cycle	BMS CAN bus Supported						
	UPS						
	Battery(cell、module、pack)			$\checkmark$	$\checkmark$		
Simulation	Super Capacitor						
	Power Supply						
DCIR	Battery(cell、module、pack)			$\checkmark$			
EV/HEV Testing	Battery Super Capacitor						
Evillev results	Production Testing						
Pulse and HPPC Testing	Battery(cell、module、pack)						
r alse and r in r e results	Super Capacitor			$\checkmark$			
	1Hz						
Sampling Rate(Max)	10Hz						
	1000Hz						
	100µs						
Rising Time	20ms						
(10%-90% Load)	100ms						
	15						
	5V						
	10V/20V						
voltage Kange	48V/60V/110V						
	200V/500V/800V						
	160µA/1mA/50mA/3A/6A						
Current Pango	10A/20A/50A/100A/200A						
Current Kange	300A/500A/1000A						
	3000A						
	1CH/2CH/4CH						
	8CH/16CH/32CH						
Number of Channels	64CH/80CH/128CH						
	256CH/512CH	$\checkmark$					
Technology	ТНҮ					$\checkmark$	
тестноюду	IGBT						

## Neware Cares More

The most we care is safety, safety of people, safety of equipment, safety of specimen, safety of data.

#### **Reliability:**

Reliability to a testing system means the controlled output and the measurement are accurate, the system is robust and durable. Through efforts from our R&D, Engineering, Production, Quality and CRM teams, we are confident to be your testing partner.

#### Software – Integrated solution:

Software helps us simplify and solidify our business. And we think this will do the same to you.

### Safety



### **Reliability**





Lithium Ion Cell Operating Window

4

Cell Voltage(V)

6

8

-DV+

-DV.

300

200

-50

Powe Data

### Software-Integrated solution

Neware provides the world-class battery testing instruments. Our systems are capable of testing almost all the energy devices in the market, from traditional electrochemical batteries to the newest super capacitors, energy devices with Can or SMBus protocols, etc.

And more over, our system could be easily integrated with 3rd party facilities, such as environment chamber, shaker table, infrared camera, etc., altogether with our own auxiliary channels. They greatly extended the ability of our systems.

We also offer integrated battery test systematic solutions to international battery labs, universities, battery manufacturers, etc.



### BTS + BTSDA: For battery testing control and result analysis

BTS and BTSDA are the bundled softwares to Neware battery testing instruments, BTS(client and server) is a typical C/S structure software for controlling battery tests: program the battery testing schedules, start battery tests, sort and grade batteries according to user-defined conditions, etc. And BTSDA is the Data Analyzer for the battery testing results. It shows the data in curves and is capable of exporting data into xls or txt format for further using.







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